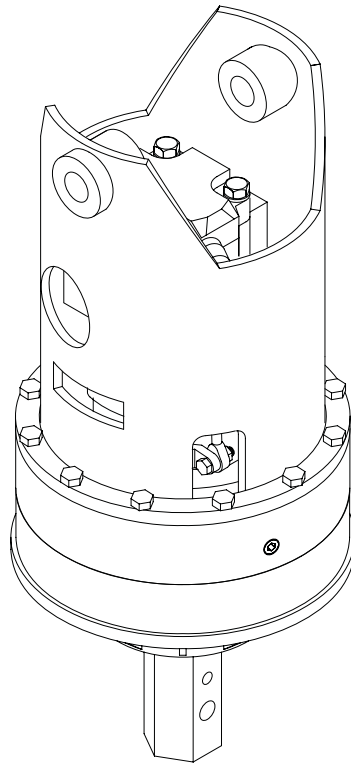


ESKRIDGE

76 PLANETARY DIGGER DRIVE SERVICE AND REPAIR MANUAL



Example Part Number

76BA	5	4	F	03	S
Series	Output Shaft	Bail Boss	Motor Supplier	Motor Number	Shift Cylinder

THIS SERVICE MANUAL IS EFFECTIVE
FROM: S/N 17050, AUG. 1993
TO: CURRENT
REF: SM76BA

76 SERIES SERVICE MANUAL

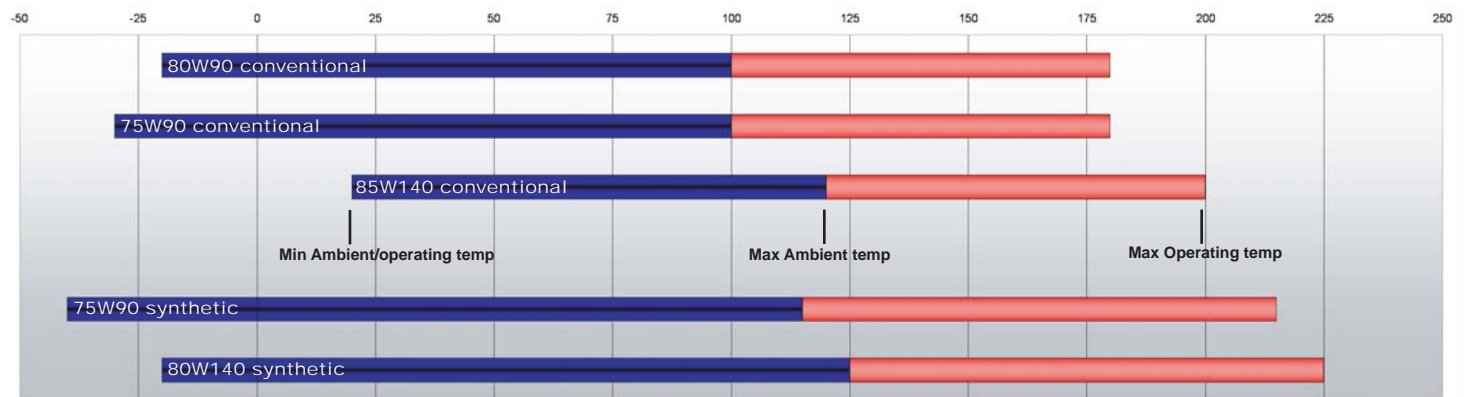
TWO SPEED PLANETARY DIGGER DRIVES

LUBRICATION & MAINTENANCE

Change the oil after the first 50 hours of operation. Oil should be changed at 500 hour intervals thereafter. All gearboxes require a GL-5 grade EP 80/90 gear oil for lubrication. Manufacturer also recommends that unit be partially disassembled to inspect gears and bearings at 1000 hour intervals.

<u>Model</u>	<u>Oil Capacity</u>	<u>Oil Level</u>
Single Stage	6.5 pints / 3.06 liters	To horizontal centerline of primary cluster gears

Recommended ambient and operating temperatures for conventional and synthetic gear lubricants



Note: Ambient temperature is the air temperature measured in the immediate vicinity of the digger. A digger exposed to the direct rays of the sun or other radiant heat sources will operate at higher temperatures and therefore must be given special consideration. The max operating temperature must not be exceeded under any circumstances, regardless of ambient temperature.

Troubleshooting

Rattling, Grinding or Whining Noises

Hydraulic motor failure and/or difficulties are commonly confused with gear drive problems, as they can share similar symptoms: reports of rattling, grinding or whining noises in the digger assembly. Carefully check the hydraulic motor for problems before removing the digger drive from the boom. If the digger drive is removed, a motor problem can only be determined by testing the motor on a hydraulic test stand or by eliminating the gear drive as the noise source after a total teardown of the unit. If you determine that the hydraulic motor is the source of the problem, please contact the original equipment manufacturer of the digger drive assembly.

Shifting Difficulties/Jumping Out of Gear

This symptom, commonly attributed to gear drive failure, can be due to air in the hydraulic lines leading to the drive, not the drive itself. Excessive back-pressure in the system may also cause this problem.

Inability to Shift into High Gear

This symptom can be due to a poorly adjusted shift cylinder. While the cylinder is carefully set at the factory, the process of disassembly may turn or move the cylinder in such a way that it contacts the case; contact between the cylinder body and the gear drive prevents the rod from making its full one inch travel.

Difficult, Rough or Impossible Shifting

Hand testing a shifter may indicate a "no shift" condition even when the shifter is okay. If metal-to-metal contact is made, a short turn of the output shaft may align shifter and allow shift to occur.

Diagnosing the Upper Gear Drive Area

The Series 76 digger drive cannot be shifted "on the fly." The digger drive must be at a complete stop, with the load removed (backed out of hole in ground), before shifting. Shifting on the fly is the primary cause of damage to the gears in the shifter assembly. Damage caused by shifting on the fly will be seen as initial grinding of the gears at the gear faces, a wear pattern developing on the top of the cluster gears and on the shift gear itself, and a severe wear pattern developing on the points of the shifter gear. Additionally, the sun gear will show damage on the points: a rounding, or even severe burring, of these parts is possible.

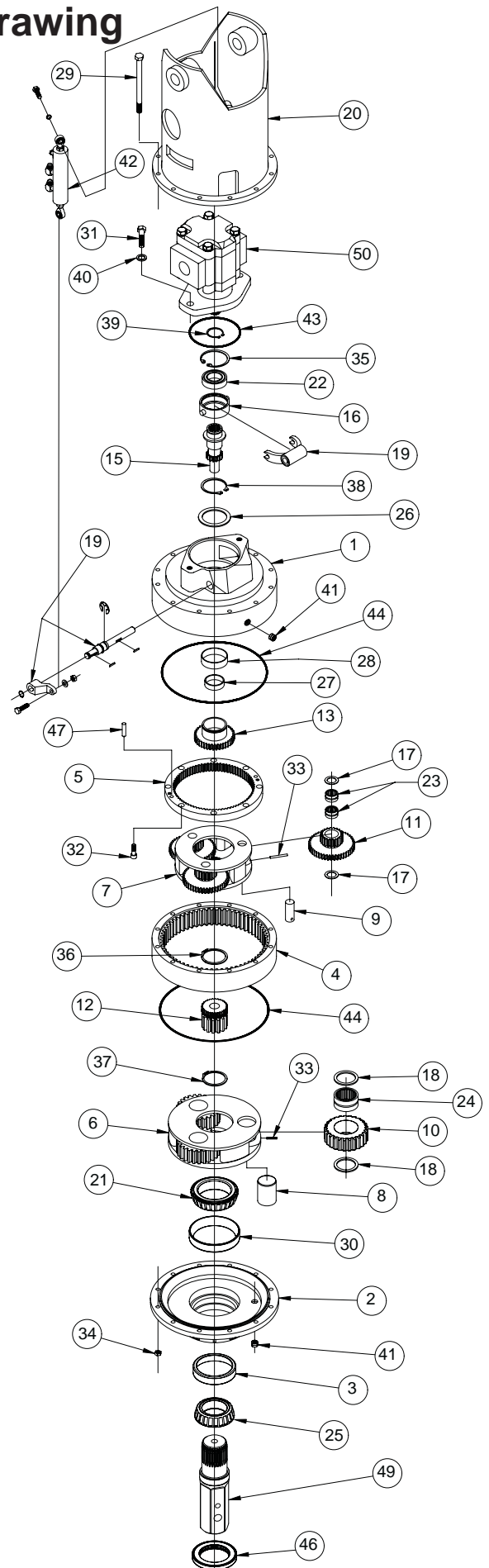
Exploded View Drawing

76BA & 76BC (TWO SPEED)

ITEM	QTY	76BA	76BC	DESCRIPTION
1	1	71-004-0014	—————▶	TOP CASE
2	1	71-004-2144	—————▶	BEARING CARRIER
3	1	01-103-0080	—————▶	BRG., LOWER SHAFT CUP
4	1	71-004-0042	—————▶	RING GEAR, SEC.
5	1	71-004-0142	—————▶	RING GEAR, PRI.
6	1	71-004-0073	—————▶	PLANET CARRIER, SEC.
7	1	71-004-0113	71-004-0433	PLANET CARRIER, PRI.
8	3	71-004-0081	—————▶	PLANET PIN, SEC.
9	3	71-004-0121	—————▶	PLANET PIN, PRI.
10	3	71-004-0092	—————▶	PLANET GEAR, SEC.
11	3	71-004-0132	71-004-0412	CLUSTER GEAR, PRI.
12	1	71-004-0102	—————▶	SUN GEAR, SEC.
13	1	71-004-0172	71-004-0402	SUN GEAR, PRI.
15	1	71-004-0562	71-004-0572	SHIFTER GEAR
16	1	71-004-0772	—————▶	SHIFTER COLLAR
17	6	71-004-0861	—————▶	WASHER, PRI.
18	6	71-004-0871	—————▶	WASHER, SEC.
19	1	71-005-0302	—————▶	SHIFTER SHAFT ASSY
20	1	PER CUSTOMER SPEC		BAIL ASSY
21	1	01-102-0100	—————▶	BRG., UPPER SHAFT CONE
22	1	01-100-0040	—————▶	BRG., SHIFTER
23	6	01-105-0010	—————▶	BRG., PRI. PLANET
24	3	01-105-0020	—————▶	BRG., SEC. PLANET
25	1	01-102-0090	—————▶	BRG., LOWER SHAFT CONE
26	1	01-112-0030	—————▶	THRUST RACE
27	1	01-127-0010	—————▶	BUSHING
28	1	71-004-0151	—————▶	BUSHING
29	12	01-150-0020	—————▶	CAP. SCR., 3/8-16
30	1	01-103-0090	—————▶	BRG., UPPER SHAFT CUP
31	2	01-150-0110	—————▶	CAP. SCR., 5/8-11
32	8	01-150-0520	—————▶	CAP. SCR., S.H., 3/8-16
33	6	01-153-0020	—————▶	ROLL PIN, 3/16
34	12	01-158-0360	—————▶	HEX. FLANGE NUT, 3/8-16
35	1	01-160-0100	—————▶	SNAP RING, INT., NO. 268
36	1	01-160-0030	—————▶	SNAP RING, EXT., NO. 255
37	1	01-160-0020	—————▶	SNAP RING, EXT., NO. 237
38	1	01-160-0040	—————▶	SNAP RING, EXT., NO. 250
39	1	01-160-0110	—————▶	SNAP RING, EXT., NO. 156
40	2	01-166-0040	—————▶	LOCKWASHER, 5/8
41	2	01-207-0010	—————▶	PIPE PLUG, 1/2 NPT
42	1	SHIFT CYLINDER ASSEMBLIES		
		71-002-0601	—————▶	SINGLE ACTING (STD) HYD.
		71-002-1351	—————▶	SINGLE ACT. HEAVY DUTY HYD
		71-002-0692	—————▶	DOUBLE ACTING HYD.
		71-002-0322	—————▶	AIR
		71-002-1542	—————▶	VACUUM
43	1	01-402-0010	—————▶	O-RING, NO. 250
44	2	01-402-0020	—————▶	O-RING, NO. 276
46	1	01-405-0540	—————▶	OIL SEAL
47	2	01-152-0070	—————▶	DOWEL PIN
49	1	71-004-0513	—————▶	2-1/2" HEX. OUTPUT SHAFT
		71-004-1383	—————▶	2-5/8" HEX. OUTPUT SHAFT
50	1	PER CUSTOMER SPEC		HYDRAULIC MOTOR

OPTIONS

SEAL KIT P/N 76-016-2011
INCLUDES ITEMS 43, 44, 46 AND
O-RING FOR SHIFTER SHAFT ASSEMBLY.
E.C.N. 1803
X76-AB DATE: 5-02-06



Unit Disassembly Procedure

(Refer to Exploded View Drawing on Page 3)

- 1) Scribe from bail assembly (20) to the bearing carrier (2), across the outside of the digger drive to assure proper orientation of oil fill and drain plugs, motor mounting, etc., as the unit is reassembled.
- 2) To drain oil, position unit on its side and remove oil plug (41) located in the top case (1). To help ventilate oil while draining, loosen hydraulic motor bolts (31). Maximum drainage occurs when oil is warm.

NOTE: Particular care should be taken when placing the unit in a position for servicing. Unit should be blocked up so that weight of the unit is resting on the bearing carrier (2). This fixture must be secure so that the auger drive will not tip over during disassembly and assembly procedures.

- 3) Loosen upper shift cylinder bolt (part of Item 42); note location and remove.
- 4) If shifter performance is in doubt, leave lower bolt in place and follow cylinder adjustment procedure (Step 19 in Unit Assembly Procedure) to see if poor cylinder adjustment could be the cause of "no shift" or "partial shift" condition.
- 5) Note location of lower washer. Remove lower shift cylinder (42), bolt, nut and washer; bolt and nut are accessible through the bail.
- 6) Remove twelve hex head capscrews (29) and hex flange nuts (34) from bail assembly (20); lift bail from unit.

NOTE: There are no bolts retaining the major components together; proceed with caution when moving the unit.

- 7) Remove two capscrews (31) and lock washers (40) from hydraulic motor (50). Notice that the motor is larger on one side: it must be replaced the same position as removed. Remove motor from unit. Check o-ring (43) for damage.
- 8) Observe location of shift fork (part of Item 19), shifter gear assembly (Items 15, 16, 22, 35 & 39) and top case (1). Check for binding or loose shift connections.
- 9) Press down on shift lever (part of Item 19). Remove shifter gear assembly (Items 15, 16, 22, 35 & 39). If shifter is jammed in sun gear (13) and cannot be removed, dismantle shifter assembly in the case by removing snap rings (35 & 38) and pulling bearing (22) and collar (16) out of fork. Shifter gear (15) should be free of nicks, burrs or gouges.
- 10) Use a screwdriver, wood chisel or similar flat strong tool ground flat for insertion between the aluminum top case (1) and the ring gear (4). Tap lightly on tool: do not drive into case, heavy prying will damage the o-ring contact surfaces in the case. Remove the top case assembly (includes Items 1, 5, 13, 19, 26, 27, 28, 32, 38, 41 & 47).
- 11) Lift the primary planet carrier subassembly out of the unit (includes Items 7, 9, 11, 17, 23 & 33).
- 12) If sun gear (12) has not been removed from digger drive, do so now. (Sometimes the sun gear sticks to the primary carrier (7).)
- 13) Remove secondary ring gear (4).
- 14) Remove retaining ring (37) from end of output shaft (49).

CAUTION: Output shaft is not retained at this point.

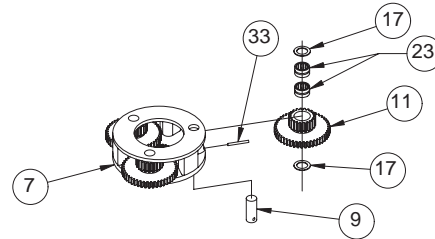
- 15) Lift the secondary planet carrier subassembly out of the unit (includes Items 6, 8, 10, 18, 24 & 33); use a puller, if needed.

NOTE: See Service Bulletin #013 concerning the wear of secondary planet carriers.

The unit is now disassembled into groups of parts and/or subassemblies. The area(s) requiring repair or service should be identified by thorough inspection of the parts after they have been washed in solvent.

Primary Planet Carrier Subassembly

(Items 7, 9, 11, 17, 23 & 33)



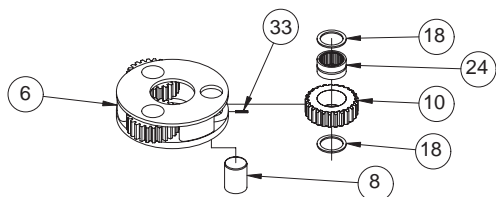
Disassembly

Rotate cluster gears (11) to check for any abnormal noises or roughness in the primary planet bearings (23) or planet shafts (9). If replacement or further inspection is required, proceed as follows.

- 1) Drive the roll pins (30) completely into the planet shafts (9).
- 2) Press planet shafts out of carrier (6).
- 3) Remove cluster gears (11) and primary planet washers (17) from carrier (6). The cluster gears are a matched set and all three should be replaced if damaged.
- 4) If any of the primary planet bearings (23) need replacing, press them out of planet gears (11); replace with new bearings.
- 5) Check primary planet shafts (9) for any abnormal wear, especially ones in which bearings needed to be replaced. If any abnormal wear is found, replace planet shaft.
- 6) Using a punch, drive roll pins (33) out of planet shafts (9).
- 7) With a primary planet washer (17) on both sides of cluster gear (11) and with bearings (23) installed, slide gear into carrier (7) and insert primary planet shaft (9) through carrier, planet gear and washers.
- 8) Planet shafts (9) should be installed with chamfered end of 1/8 inch hole toward outside diameter of the carrier (7). This will aid in alignment of holes while inserting roll pins (33).
- 9) Drive three roll pins (33) through the carrier holes and into the planet shafts to retain the parts.

Secondary Planet Carrier Subassembly

(Items 6, 8, 10, 18, 21, 24, 33 & 37)



Disassembly

As with the primary planet carrier subassembly, check for abnormal noise in the planet gear bearings (24) by rotating the planets while listening for any noise and feeling for any roughness. If further inspection or replacement is required, follow the same procedure as Steps 1-6 of the Primary Planet Carrier Subassembly Procedure. Substitute items as indicated: secondary planet gears (10), secondary planet bearings (24), secondary planet shafts (8), secondary planet washers (18) and secondary planet carrier (6).

The inner bearing cone (21) cannot be removed from the carrier (6) without destroying the bearing. If the bearing needs replacement, please consult Eskridge.

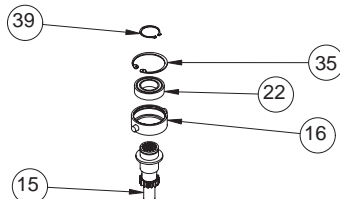
Proceed with Steps 7-9 of the Primary Planet Carrier Subassembly Procedure.

NOTE 1: See Service Bulletin on Page 10 concerning the wear of secondary planet carriers (6).

NOTE 2: Retaining ring (37) must be inserted into carrier (6) before it is installed in unit, as described in Step 2 of the Unit Assembly Procedure.

Shifter Gear Subassembly

(Items 15, 16, 22, 35 & 39)



Disassembly

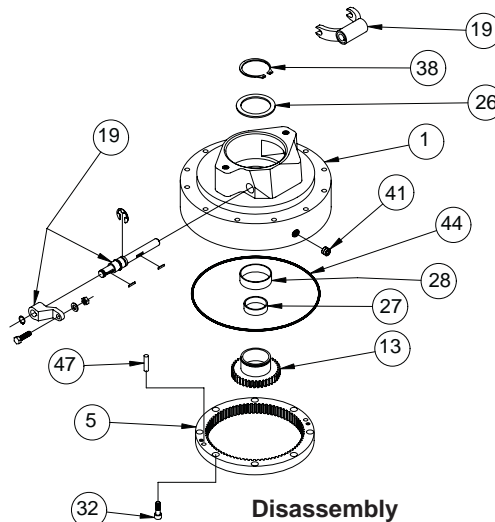
- 1) To disassemble shifter gear assembly, remove retaining ring (39) and pull pieces apart.
- 2) Check for worn parts; replace as necessary.

Reassembly

- 1) Reassemble in reverse order.

Top Case Subassembly

(Items 1, 5, 13, 19, 26, 27, 28, 32, 38, 41 & 47)

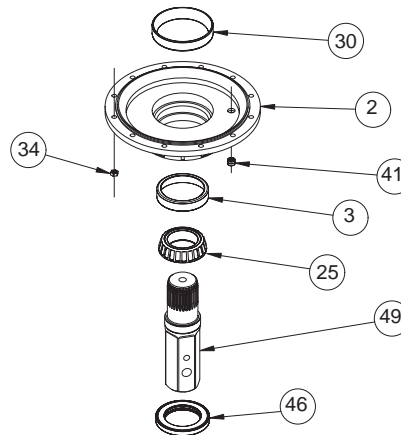


Disassembly

- 1) Inspect primary ring gear (5) for abnormal wear or damaged teeth. If replacement is required, remove eight socket head capscrews (32) from ring gear. Primary ring (5) is doweled into top case (1); use puller holes provided to thread two 3/8-16 bolts into ring gear (5) until part was completely separated from top case (1).
- 2) If installing a new primary ring gear (5), always install new dowel pins (47) into ring gear before reassembling into top case (1).
- 3) To remove sun gear (13), first remove retaining ring (38) and shim (26).
- 4) To disassembly shift lever and fork, remove large retaining ring on inside, then slide apart.
- 5) Inspect o-ring on shift shaft for damage. Lubricate shaft with grease when reassembling.
- 6) Reassemble top case before continuing to Unit Assembly Procedure.

Base Subassembly

(Items 2, 3, 25, 30, 41, 46 & 49)



Disassembly

CAUTION: Output shaft is no longer retained; care should be taken not to injure feet because output shaft can fall out. Additional care should be taken not to damage output shaft when it is pressed through base.

1) Output shaft removal:

Bearing carrier (2) should be set pinion side down, as shown, on a plate or table with output shaft (49) protruding through a hole in the table. Press output shaft out bottom of base by applying a load to top end (internal end) of shaft until it passes through inner shaft bearing cone (21).

NOTE: If reusing old bearing cone, do not damage roller cage by pulling on it.

- 2) If outer bearing cone (25) needs to be replaced, a gear puller may be used to remove it from output shaft (49).
- 3) Remove the shaft seal (46) for inspection or replacement. Lubricate inner lip of new shaft seal (46) and slide the seal onto the shaft (49) until it fits snugly over shaft seal diameter with the open side toward the inside of the digger drive.

Reassembly

NOTE: Press bearing cone onto output shaft by pressing on inner race only. Do not press on roller cage, or it may damage bearing.

- 1) Press outer bearing cone (25, large end down as shown) onto the shaft until it seats against the shoulder. Bearing cone (25) may be reused if it was removed only to replace the seal (46).
- 2) Clean all foreign material from magnetic oil plug (41). Add a small amount of pipe thread compound to pipe plug before installing back into bearing carrier (2).
- 3) Place the bearing carrier (2, output side up, opposite shown in diagram) on the press table.
- 4) Apply a layer of lithium or general purpose bearing grease to surface of outer bearing cup (3). Insert the shaft (49) into the bearing carrier (2, bearing cone down) and use a soft hammer to install the shaft seal (46) into the bearing carrier.

CAUTION: Output shaft is not retained at this point.

- 5) Invert this assembly on the press table, so it is standing on the shaft.

All subassembly service or repairs should complete at this point. Continue to Unit Assembly Procedure to complete unit buildup.

Unit Reassembly

(Refer to Exploded Drawing on Page 3)

A special tool should be made for the timing process. An old timing gear, cut off above the lower gear and welded to a 6" long bolt, works well. If an extra timing gear is not available, the timing will be more difficult; the timing tool keeps gears in time as they mesh with primary ring gear (5) (mounted in top case (1)).

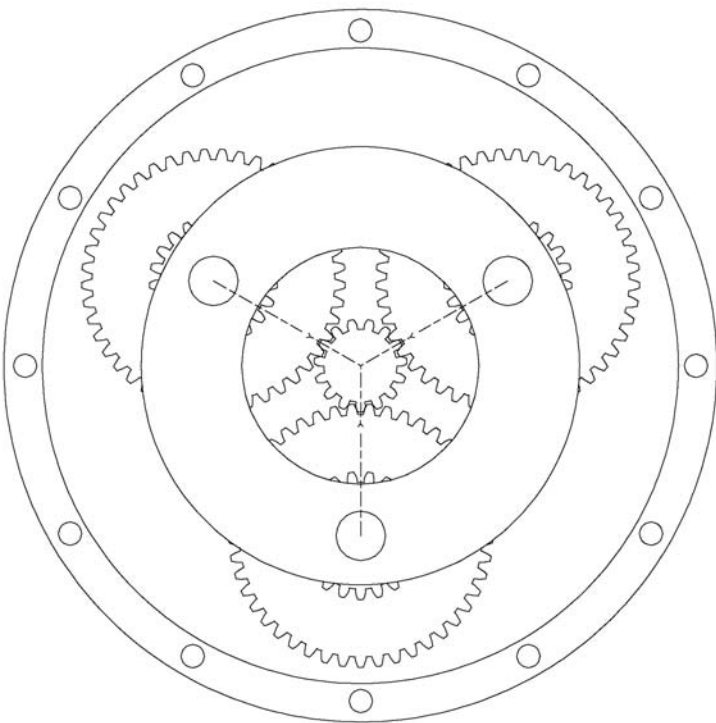
- 1) When all subassemblies are complete, the unit is ready to be assembled. Place lower assembly back on blocks, which were used during the initial unit disassembly procedures, for remaining unit build up.

CAUTION: Output shaft is not retained.

- 2) Install a new o-ring (44) on the bearing carrier (2). Referring to scribe marks for proper orientation, install the secondary ring gear (4).
- 3) Push retaining ring (37) into center of secondary planet

carrier (6).

- 4) Install the secondary planet carrier (6) assembly by rotating it until carrier spline lines up with shaft spline. Begin pressing carrier onto shaft.
- 5) Before secondary carrier is fully seated, install retaining ring (37) onto end of output shaft.
- 6) Continue pressing secondary carrier until fully seated. Check retaining ring (37) to be sure it is in the ring groove.
- 7) Install a new o-ring (44) on the bearing carrier (2).
- 8) Check to be sure retaining ring (36) is installed on sun gear (12). Slide the sun gear into the secondary planet carrier.
- 9) Install the primary carrier (7) by rotating until spline lines up with sun gear; assembly should drop into place.
- 10) Install a new o-ring (44) on top case (1); use grease to help hold it in place.



11) Timing Procedure:

There are machinist's marks on each of the three cluster gears (11). These marks should be aligned so that each points toward the center of the primary planet carrier. See Timing Procedure Diagram.

Use the of the timing tools mentioned above will make top case installation easier. Leave the timing tool in the center of the cluster gears and use it to rotate them until top case is properly installed.

While keeping the timing marks aligned, position the top case (1) near the proper orientation to scribed line on outside of unit. Work top case down until fully seated with gears in time.

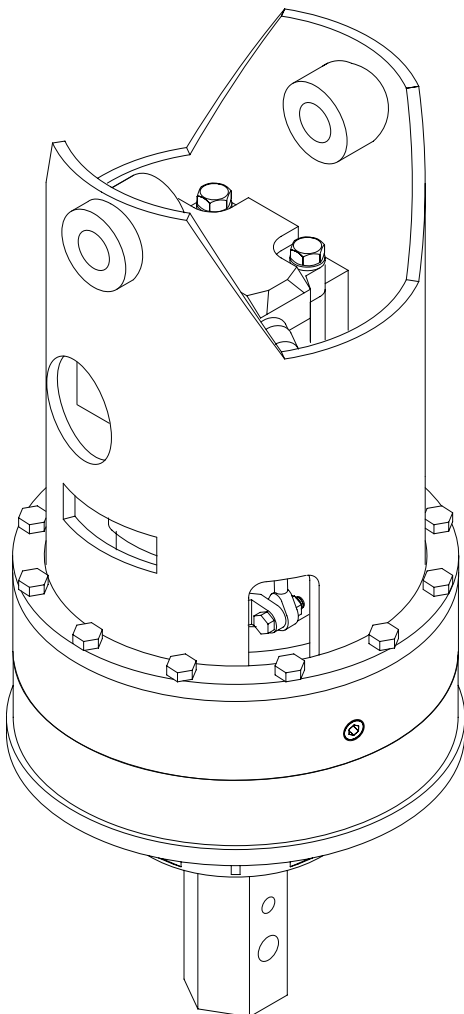
CAUTION: If unit is not properly timed, the gear drive will be severely damaged. Be sure gear drive turns smoothly and easily.

- 12) Fill unit with EP 80/90 gear oil to proper level as specified on Page 2.

- 13) Install shifter gear assembly **(15, 16, 22, 35 & 39)** by lifting shift lever **(part of Item 19)** to allow clearance.
- 14) Install o-ring **(43)** onto hydraulic motor **(50)**.
- 15) Using hand tools to avoid stripping the aluminum, install hydraulic motor **(50)** on mounting pad on top case **(1)** with two capscrews **(31)** and lockwashers **(40)**; torque to 130 ft-lbs.
- 16) Bolt lower end of shift cylinder assembly **(42)** to shift lever **(19)**.
- 17) Line up scribe mark on bail assembly **(20)** with scribe mark on top case **(1)** and lower bail over hydraulic motor **(50)** until bail flange contacts the cover.
- 18) Check all o-rings to make sure they are properly seated. Install twelve capscrews **(29)** with hex flange nuts **(34)** and torque to 30 ft-lbs.
- 19) Install and adjust shifter:

Shifter cylinder should be compressed to its shortest length. Next, with the shifter gear pushed all the way up (bail side), adjust the length of the shifter cylinder to allow installation; torque to 70 ft-lbs.

THE DIGGER DRIVE IS NOW READY FOR USE.



Revision 1 supersedes bulletin dated 01/14/86

Date: 06/01/87

Reference: All Series 71/76, 72/77 and 73/78 Digger Drives

Subject: Inspection of Secondary Carriers

When repairing, updating or inspecting an auger drive, the secondary carrier should be inspected for possible wear around the spline where it contacts the shaft retaining ring. Under heavy use and/or in rocky regions, continual impacting of the retaining ring against the carrier may cause wear in this area. If it wears to a beveled shaped, high loading in the pull out direction could cause the shaft retaining ring to dislodge from its groove allowing the hex shaft to pull out of the unit.

If the carrier is found to be worn to a bevel shape when inspected, it should be replaced with carrier part number 71-004-0073. Units with serial numbers prior to 4900 should also have the hex output shaft replaced with the current production revision, part number 71-004-0513.

Fill gear drive with EP 80/90 gear oil until it runs out of the fill plug while the digger drive is leaning approximately $3\frac{1}{2}^{\circ}$ from vertical (about 7°). A dry gear drive will hold about $6\frac{1}{2}$ pints of oil in this condition.

